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ODORIFEROUS SUBSTANCES USED IN PERFUMERY.

Die Riechstoffe. By Georg Cohn, of Görlitz. Pp. viii+219. (Brunswick: Vieweg und Sohn, 1904.) Price 6 marks.

THIS useful little monograph is a section, published in separate form, of Bolley-Engler's "Handbuch der chemischen Technologie." It is not easy to find a single expression in English which could be regarded as the precise equivalent of the German "Riechstoff" in the sense used by the author. The term as here employed is meant to apply to odorous substances of a pleasant smell and of definite chemical composition—in other words, to chemical individual compounds having a more or less fragrant odour. It is obvious that the word perfume does not apply, because a perfume is generally a mixture of various odorous and non-odorous compounds, this being invariably the case with natural perfumes or fragrant plant oils.

The information contained in the present work is to be found in the larger treatises dealing with this subject, the works of Gildemeister and Hoffmann in Germany, of Charabot and his colleagues in France, and of Sawer in this country being familiar to all who are interested in this branch of chemical technology. The arrangement of the subject-matter by Herr Cohn, however, and the inclusion of the later discoveries entitle the little work under notice to take rank as an original contribution to the literature of this branch of applied organic chemistry. In fact, taking into consideration the large amount of information compressed into the volume, and the completeness with which the ground has been covered within a comparatively small compass, it may be fairly claimed that the treatment is more scientific and less technical than in the standard treatises referred to, and chemists who wish to get a general idea of the development of their science in this newer field will find the work of Herr Cohn a very valuable compendium.

The book is divided into ten chapters and an appendix. After defining the term "Riechstoff" in the sense above indicated, the literature of the subject is given in the second chapter, not the least valuable portion of which is a tabulated list of German patents classified under the chemical families to which the patents relate, such as alcohols, ethers, esters, aldehydes, ketones, &c. In the third chapter the historical development of the industry is dealt with, and it is pointed out that while perfumery as an art is of extreme antiquity, the scientific, *i.e.* chemical, history of the compounds employed is a comparatively recent development. The same may be said, it is perhaps hardly necessary to point out, of the tinctorial industry, which existed as an art ages before it came within the province of chemical science. The parallelism between these two branches of technology does not, however, end with this historical analogy, since the development of synthetical chemistry has enabled many natural odorous compounds to be made more economically than they can be obtained from natural sources, while many such compounds unknown in nature have been synthesised in the laboratory and transferred to the factory. The author gives (pp. 20–21) a list of twenty-one firms which are engaged partially or wholly in the manufacture of natural or synthetical perfumes. Of these, three are French, and the remainder German and Swiss. It is not apparent why English and other manufacturers have been excluded. The writer of this notice has a very distinct recollection, when examining the chemical products at the Paris International Exhibition in 1900, of seeing some very good exhibits of perfumes by English and colonial manufacturers. It is true that in the application of *chemical science* to the industry Germany and France are far ahead of this country, but this does not do away with the fact that we have a few factories here which ought at any rate to figure in any list having for its object the instruction of the public as regards the present state of any particular industry.

The fourth chapter, dealing with the occurrence of odorous compounds in nature and with plant physiology, is of particular interest. A list, occupying nearly nine pages, contains the names of all the plants, arranged under their botanical orders, which yield ethereal oils. Another set of tables, occupying twenty-one pages, gives at a glance the name of the ethereal oil, the part of the plant from which it is obtained, the botanical source, the yield per cent., the physical constants (sp. gravity and rotatory power), and the chemical constituents. These tables thus summarise in synoptical form the present state of knowledge of plant oils, and in view of their importance it is much to be regretted that the printing has not been arranged in a less confusing way. The entries, as read horizontally, run across both pages, and by the time the eye has reached the last column, containing the chemical constituents of the oil—to many readers the most important item of information—the connection with the particular oil named in the first column is lost or rendered ambiguous, and the entry has in many cases to be traced back again to make sure which oil contains such or such constituents. We are all familiar with, and have often been led astray by, this want of precise correspondence between the horizontal entries running across both pages of a railway time-table. If in future editions the horizontal entries could be divided by horizontal lines running across both pages there would be no ambiguity, and the tables would be very much enhanced in value.

An interesting point to which the author directs attention is the rarity of the ethyl group in natural ethereal oils. Methyl, propyl, allyl, propenyl, are all of widespread occurrence in the molecules of natural organic compounds—ethyl occurs but in a few exceptional cases, and some of these are doubtful. We could add many to the few cases of the occurrence of ethyl in natural products given by the author, but his general statement is nevertheless correct so far as our present knowledge goes. Extreme advocates of the temperance movement might even find scientific justification for their position in this fact, which is stated by Herr Cohn in the form of an aphorism:—

"Die Natur hat einen *horror* vor dem Alkohol" (p. 28).

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Unfortunately for this argument, however, alcohol (ethyl) is itself a biochemical product.

The fifth chapter deals with the modes of preparation and extraction of odorous compounds, and with their synthetical production. The special part of the work (pp. 67–175), devoted to the description of the general modes of preparation of the various compounds classified under chemical families, may be looked upon as a chapter of synthetical organic chemistry having special reference to the formation of odorous compounds, and requires no further comment.

The headings of chapter vi. (physical properties of odorous compounds), chapter vii. (chemical characters and relations between odour and chemical constitution), chapter viii. (quantitative valuation), chapter ix. (physiological relations), and chapter x. (applications of odorous compounds) sufficiently indicate their contents. Chapters vii. and ix. will be found of interest to physiologists as well as to chemists.

We have not found many slips in this little monograph, and it can be safely consulted by all who are interested in the subject. The statement (p. 184) that *m*-oxybenzaldehyde derivatives do not occur in nature is erroneous (see, *per contra,* Jowett, *Trans.* Chemical Society, vol. lxxvii. p. 707). Haller's important partial synthesis of camphor from homocamphoric acid (p. 145) might have been mentioned in the reference given in the foot-note. The omission of English firms from the list on pp. 20–21, and the faulty arrangement of the tables on pp. 38–57, have already been referred to.

Those chemists who, without any special knowledge of the subject, will take the trouble to look through this volume cannot but realise that a new and important branch of industry has been developed out of the ancient art of perfume making. It is apparent also that this newer development is the direct outcome of the application of chemical science—the utilisation for practical purposes of facts and principles discovered by laboratory research. It is the history of the coal-tar colour industry re-told, and we may fairly ask, as in the case of this last branch of manufacture, what is this country doing in the matter? The writer does not propose to do more than raise the question here, because the set reply of "imperfection of patent laws" and "want of duty-free spirit" will no doubt be considered all-sufficient by the majority of our manufacturers. Passing over this point, however, there is another aspect of the modern perfume industry which is of particular interest. Concurrently with the development of synthetical processes and the introduction of new products, a keen and searching examination of volatile plant oils has for many years past been systematically carried out in the laboratories of several foreign factories. Without wishing to be invidious, the firm of Schimmel and Co., of Leipzig, may fairly be named as pioneers in this branch of work. The semi-annual report of this firm is a perfect mine of information concerning the chemical composition of ethereal oils. Now the detection of the chemical constituents of products resulting from the vital activity of plants is also a matter of physiological importance, so that the workers in this field—prompted, no doubt, primarily by practical considerations—are accumulating a stock of material for which plant physiologists ought to be grateful. Certainly no physiologist can afford to ignore this material, buried though it may be in a trade publication, and worked up without direct scientific aim. But the methods employed and the results achieved are as purely scientific and far more definite than much of the work that at the present time passes into literature as physiological chemistry. We have as pretty an illustration as modern times can furnish of the action of pure science upon industry, and the reaction of industry upon pure science.

R. MELDOLA.

SYSTEMATIC BOTANY.

The Classification of Flowering Plants. Vol. i. Gymnosperms and Monocotyledons. By A. B. Rendle, D.Sc. Pp. xiv+403. (Cambridge: University Press, 1904.) Price 10*s.* 6*d.* net.

THE practice which is gaining ground, whereby, to the exclusion of the general text-book, the specialist produces a book in which he takes up merely his own branch of a scientific subject, is satisfactory both from the point of view of the author and the reader. The author is well qualified to express his opinions, and the reader cannot fail to learn much from the critical exposition which he is tolerably sure to obtain. The book under notice is significant not only because it is written by one of our leading systematists, but also inasmuch as it is one of the first taxonomic treatises—another is Willis's "Manual of Flowering Plants and Ferns"—which follows Engler's system of classification. Bentham and Hooker's classification is followed in most British herbaria and collections, but there is much to be said in favour of training students in the system which, originally propounded by Eichler, has been modified by Dr. Engler, one of the principal reasons being that the arrangement of orders, although not developmental, at any rate provides a sequence which is distinctly helpful.

Regarding the title, whereas it is now recognised that the spore-bearing shoots of some of the Pteridophyta may be called flowers, Dr. Rendle has used the term in its ordinary signification, and the first volume deals with Gymnosperms and Monocotyledons, while a second volume will be devoted to Dicotyledons.

After a short historical review of the principal systems of classification which have been proposed, the author takes up the Gymnosperms, making six classes by the inclusion of the two fossil groups, the Cordaitales and the Benettitales. A chapter upon the morphology of the Angiosperms follows, after which the remainder of the book is concerned with the classification of the Monocotyledons.

The Gymnosperms have been very much to the fore of late years, and there is nothing strikingly new in the treatment of the group. The interweaving of the fossil classes is distinctly rational, and the reader will find a good general account, including the results of modern research. A considerable number of the distinctive features of the genera appear in the general account, and a few in the enumeration of the genera, but the latter might with advantage have been expanded.